

MARINE MAMMAL - FISHERY INTERACTIONS IN HAWAII

By

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Marine mammals are involved, in one way or another, in seven fisheries in Hawaii. In one of the fisheries, the longline fishery, there are two unrelated types of marine mammal interference. From a fisherman's viewpoint, one involvement is beneficial while the others are detrimental. This paper is an account of the fisheries and the role of marine mammals in those fisheries.

The information presented was obtained from interviews with individuals in the fishing industry and field observations by Robert T. B. Iversen, John J. Naughton, and myself of the National Marine Fisheries Service, and Edward Shallenberger of Sea Life Park.

Troll Fishery for Yellowfin Tuna, *Thunnus albacares*

Trolling for yellowfin tuna with rod and reel occurs throughout the State of Hawaii, mostly in the leeward areas of the major islands. This is the fishery in which the presence of a marine mammal is beneficial to the fishermen. About 5 yr ago fishermen in the Kona area on the leeward (west) side of the island of Hawaii discovered that trolling in the vicinity of herds of spotted porpoise, *Stenella attenuata*, was effective for yellowfin tuna. Fishermen from other islands have probably adopted this practice since.

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In the last 2 yr the Kona fishermen have combined fishing near spotted porpoise with a revival of an old Hawaiian method of chumming. In this case, the fishermen stop their boats near the porpoise and drop a rock around which chum is wrapped with twine. The chum is released at the desired depth with the unraveling of the twine by selecting the appropriate length of twine. Rod and reel is still the gear used but obviously the lure is not trolled.

#### Fishery for Bottom Fish With Handlines

Bottom species, mostly snappers, found at bottom depths of 120-250 m are fished with handlines. The most commonly caught species are: the snappers, *Pristipomoides microlepis*, *P. sieboldii*, *Etelis carbunculus*, *Aphaereus rutilans*, *Aprion virescens*; the carangid, *Seriola dumerilii*; and the grouper, *Epinephelus quernus*. Six hooks spaced at 0.4-0.6 m intervals are fished on a handline. Above the highest hook is a chum bag consisting of a cloth square about 30 cm on a side and a lead disc. The cloth is wrapped around the disc and chopped fish and tied with a slip knot. The "bag" is opened with a strong jerk on the line. The hooks are fished 1-3 m off the bottom. The fishermen usually wait until several fish, preferably six, are hooked before pulling up the line manually. A handline fisherman usually fishes alone from a 4- to 6-m boat.

In the Kona area the bottlenose dolphin, *Tursiops gilli*, remove the catch when the line is being hauled. A single animal can remove all six fish in the time it takes to haul the line. In the process

of taking a fish, a dolphin usually pulls out 10-15 m of line. When the topmost hooks are already on board and a dolphin strikes, the fisherman is in danger of injury from the rapidly outgoing hooks.

The Kona area is apparently the only area where bottom fishermen have a dolphin problem. The impact of these animals was serious enough to cause most of the fishermen to quit this mode of fishing. The number of *Tursiops* involved was reported to be less than 30. When questioned in December 1977, however, several fishermen indicated that only one or two dolphins appear on the fishing grounds and currently the problem is not as acute as in 1975.

#### Handline Fishery for Mackerel Scad, *Decapterus pinnulatus*

The catching of mackerel scad with handlines takes place at night in leeward areas over a bottom depth of 100-120 m. An incandescent bulb of about 20 w is placed underwater or directed upon the surface from the deck of the boat. For this small species of 100-300 g a light line is used. Usually six feathered jigs are attached to one line and fished at a depth of 15-25 m at the perimeter of the light.

Fishermen fishing off the Kona coast and off the Waianae coast of Oahu have complained that porpoises hovering in the dark blow once loudly, move in, and take their catch a few meters from their boats. They think that the species is the bottlenose dolphin but are not certain. Spinner dolphin, *Stenella longirostris*, and pygmy killer whale, *Feresa attenuata*, have been observed in the vicinity of these

fishermen. On the average the fishermen are bothered by porpoises one night out of four usually before 9 p.m. and after 4 a.m.

The fishermen reported that attempts to evade the porpoises by turning off the light and moving at top speed to another site several kilometers away have not been successful. The porpoises simply follow them. If they turn off the light and drift, however, the porpoises will sometimes move to another skiff in the vicinity.

#### Troll Fishery for Marlins

For many recreational fishermen the acme of their pastime is trolling for marlin. The major species caught by trolling is the blue marlin, *Makaira nigricans*. Black marlin, *M. indica*, and striped marlin, *Tetrapturus audax*, are also caught but uncommonly. Usually six lines of various lengths (6-40 m) are trolled simultaneously, one from each corner of the stern and four from outriggers on both sides of the boat.

Artificial lures are used most of the time. Some fishermen, particularly charter boat skippers in Kona, troll live bait which is usually skipjack tuna, *Katsuwonus pelamis* or kawakawa, *Euthynnus affinis*, weighing about 2 kg. The bait is towed at a speed of 0.5-1 m per sec (1-2 knots) compared to the trolling speed of 4-5 m per sec (8-10 knots) for artificial lures. In the Kona area the bottlenose dolphin interferes by taking the bait either while it is being caught or while it is being towed (Figure 1). Fishermen have tried to save their baits from porpoise predation by winding wire around the bait or by attaching welding rods or hooks to no avail. The porpoise just take a little longer than usual to detach the bait.

### Day Handline Fishery for Yellowfin Tuna

The day handline fishery for yellowfin tuna takes place off the southeastern and western shores of the island of Hawaii. Only one hook is attached to a line. The hook is usually baited with mackerel scad and placed approximately 140 m below the surface. Some of these fishermen have reported porpoises eating the smaller (less than 15 kg) yellowfin tuna on their hooks and damaging yellowfin tuna of 40-50 kg by bumping them on the ventral side. The species involved has not been identified. One fisherman reported that in the South Point area the species is not bottlenose dolphin. He also reported that only one or two individuals out of a herd of 15-20 engage in the practice of bumping the hooked fish. There are times when this porpoise will not attack the catch at all even though they may be within 10 m away. Fishermen have tried various devices, such as an "umbrella" of welding rods that collapsed over the tuna after it was caught, but without success.

### Night Handline Fishery for Tunas

The night handline fishery for tunas catches bigeye tuna, *Thunnus obesus*, yellowfin tuna, and albacore, *T. alalunga*, at the edge of the island shelf 2-20 km from shore. This fishery has recently grown rapidly. It is limited to the southern half of the island of Hawaii. The boats use 20-30 w bulbs underwater, or over surface, or both, to attract the squid, *Notodarus hawaiiensis*, which is caught for bait. The baited hooks are placed consistently at a depth of

30 m with little variation. In this fishery the fishermen have not reported any predation by marine mammals but have stated that the tunas stop biting when porpoises are around.

### Longline Fishery

The longline is made up by connecting unit sections of line. Each unit consists of 380 m of mainline and five or six branch lines with hooks. The gear is floated by buoys at the end of each unit. Each unit thus describes a catenary and the entire line is a series of connecting catenaries. Older boats in the Hawaiian fleet fish 120-180 hooks on 8-12 km of line. Three newer boats fish 600 hooks on 38 km of line. This gear catches large predator species such as tunas, marlins, and sharks. Desired fishing depth can be attained by adjusting the spacing between buoys and the length of the lines connecting the mainline to the buoys. The line is usually set just before dawn and hauled before sunset.

This fishery is faced with two problems related to marine mammals. In the Kona area where fresh mackerel scad is used for bait, porpoises remove the bait from the lines. Longline fishermen in that area claim that porpoises follow their boats out and remove every piece of bait as the line is being set. As a result fishermen have done hardly any longline fishing in this area in the last 2 yr. The fishermen call the porpoise "steno" implying that it is the rough tooth dolphin, *Steno bredanensis*. This identification has not been verified.

The longline fishermen who fish open ocean areas encounter a different problem. They occasionally bring in their lines with only tuna heads on the hooks. They claim that this happens in especially

productive tuna areas and as many as 30 large tunas (50-100 kg) have been lost on a single day's set. According to them the false killer whale, *Pseudorca crassidens*, is the culprit.

### Discussion

Marine mammal behavior adverse to fisheries appears to be most serious on the island of Hawaii, particularly in the Kona area. First reports of a problem with porpoises came from that area about 5 yr ago. In 1974 porpoise interference was reported from fishing areas off South Point and Pohoiki which are on the south and southeast sides of Hawaii. Complaints about porpoises in the Waianae area of Oahu came in 1976.

According to old time fishermen of Kona only one bottlenose dolphin took their fish 25 yr ago. In the ensuing years up until 1969 a few more adopted that practice. In 1969 there was a sudden increase in the population taking fish. At that time the problem was still localized to the central area. Since then the problem has spread along the coast of Hawaii.

The extent of marine mammal predations on the baits and catches of fishermen is still not clearly defined.

Figure 1



Pacific bottlenose dolphin, *Tursiops gilli*, taking skipjack tuna from trolling gear.



Head of skipjack tuna after attack by Pacific bottlenose dolphin.